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Building Cleveland's New Union Station

Started in March, 1922, this New Structure Will Not, at the Earliest Estimate, Be Completed Until Late in 1929. This Article Outlines the Work as Carried On to Date. The Walsh Construction Company Have Done the Majority of the Work Thus Far Completed.

IN 1786, Cleveland was a trading post. In 1890 it had a population of 261,353 and in 1920, 796,841, and yet today we find it relying upon a terminal which was built sixty years ago, and which for a long time has been too small for the city's needs. This state of affairs, however, is not to last much longer; Cleveland is to have an adequate and modern station. This is due in a large measure to the initiative of two men, O. P. and M. J. Van Sweringen, developers of the Nickel-Plate Railroad system, and, for many years, real estate operators of Cleveland.

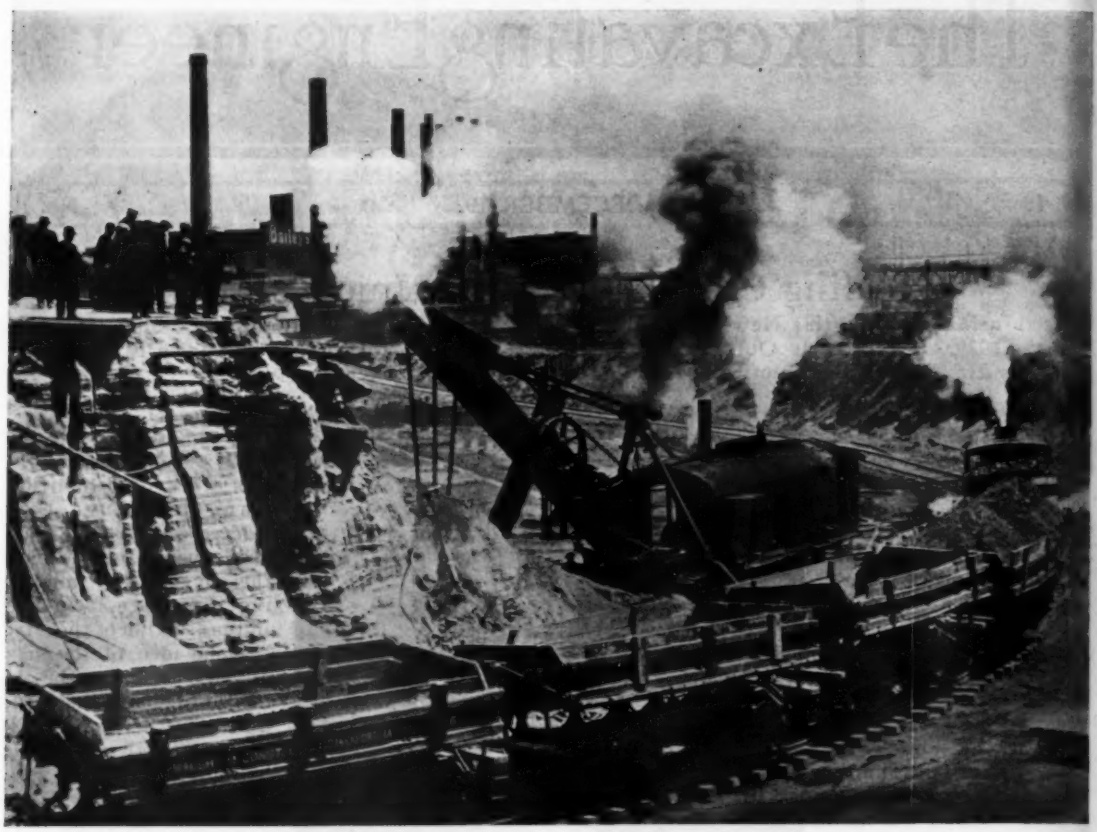
The new station, which will cover an area of thirty-one acres, will provide terminal facilities for both electric interurban lines and steam roads. It is claimed to be the only railway station in the country designed to house electric suburban and steam trains under one roof. Its location on the south side of the Public Square, in the heart of the business district, will greatly relieve traffic in this section, by providing a proper terminus for the interurban electric cars which now load and unload in the Public Square.

A model of the new Cleveland Terminal Building. The new tower above the Public Square entrance will rise fifty stories, falling short of the Woolworth Building's height by 80 feet.

In order to put the terminal in this central location, it was necessary to demolish over 1400 buildings, and in this work of demolition many buildings considered serious fire hazards were torn down, thereby greatly improving the safety from fire in that section of the city.

Some idea of the size of the project may be obtained from consideration of the following. The terminal work will be four miles long; there will be twenty-four tracks for steam trains, and ten for electric; the work involves 3,000,000 cubic yards of excavation, 250,000 cubic yards concrete work, 225,000 lineal feet of tracks, 75,000 tons of steel. Estimates of cost are around $60,000,000.

All tracks in the station will be on one level. The eastern approach will extend to East Fortieth Street, where it will join the rights-of-way of the Nickel Plate, the Erie Railroad and the Rapid Transit Line, which serves the suburban residential district known as Shaker Heights. The western approach to the station will extend to the right-of-way of the Big Four railroad at about West Twenty-fifth Street, and join the right-of-way of the Nickel Plate at about West Thirty-seventh Street. This latter approach



Excavating for Cleveland's new $60,000,000 railroad station. 2¼-yard railroad shovel at work on the first cut.

crosses the Cuyahoga River on a viaduct some 3,400 feet long, and then passes through cuts entailing the excavation of some 400,000 cubic yards.

Construction Started in 1922

The actual work was begun on March 12, 1922, when wrecking operations were begun. Since that time the work has been going steadily ahead until today the excavation and retaining walls in the station area are well under way.

So far the work has been let section by section as the old buildings were vacated and razed, so that excavation work could be pressed. All buildings have now been removed from the site except the Bell Telephone Exchange.

The Walsh Construction Company have done most of the excavation in the station area, and are moving the last part of the dirt in their present contract as this is written. The Richley Construction Company of Cleveland handled the excavation thus far done on the western approach, which involved relocating and lowering sewers to clear the new tracks and the construction of a concrete highway bridge. The Bates & Rogers Construction Company are now building another concrete highway bridge and excavating on the western approach.

At the end of 1923 about 108,000 cubic yards had been moved. At the end of 1924 about 315,000 cubic yards had been hauled to the dump. October 1, 1925, finds the work being carried on inside a steel pile cofferdam sixty feet deep, and a total of 344,200 cubic yards moved.

The Walsh Construction Company's Work

The Walsh Construction Company started work on September 30, 1923, and placed upon the job an Erie shovel, a McMyler-Interstate crane, a Browning clamshell and a Bucyrus 70-C shovel equipped with a 2½-yard dipper. The excavation consisted of clay and sand and, at the first part of the work, a good bit of old foundations. Some of the foundations were reinforced with steel bars, which made the digging more difficult in places.

The majority of the excavation was handled by the 2½-yard shovel which was served by 12-yard Western dump cars, which were equipped with side-boards so that from 18 to 20 cubic yards were carried on each car. The dump for the material from the main excavation lies about two and a half miles south of the Public Square, and was reached by hauling over the Union Terminal Company's construction tracks and the Wheeling

Up she goes!

An Artist's View of the Work on the New Station — the Figure Is Moses Cleveland.

— Donahey in the Cleveland Plain Dealer.

and Lake Erie Railroad. During part of the work it was necessary, because of the grade leading to the Wheeling and Lake Erie tracks, to bring only four cars at a time away from the shovel, and make up a train of about fifteen cars upon a siding at a higher level. The output ran from 90 to 105 cars per day. The work was carried on with one ten-hour shift per day. Since the work was carried on in the midst of the city, the contractor was obliged to make as little smoke as possible. Pocahontas coal, costing about $7.00 a ton, was therefore used.

During the season of 1924 Tom Chrisman pulled the levers on the Bucyrus 70-C, J. P. James rode the boom and R. L. Evans made the smoke.

During 1925 J. H. Gallagher was engineer, C. Amersman, cranesman, with Ray Evans again at the boiler. W. J. (Blackie) Shillato was superintendent on the job, and H. Schnoor, general foreman. The Walsh Construction Company maintain offices in Cleveland at 308 Euclid Avenue. F. W. Smith is general superintendent for the district and C. M. Rueffel the office manager.

The Concrete Footings and Retaining Walls

As mentioned above, the footings and retaining wall are at present under construction. That part, on which work is now being done, involves the placing of 6,000 cubic yards of concrete for two sections. One of these will parallel the street frontage and is 326 feet long. The angular wing wall section is about 200 feet long. The retaining wall is 43 feet in height, designed as a reinforced wall with cantilever footings, which support the exterior column piers of the buildings. The cantilever footings are 32 feet wide with a maximum depth of six feet, and are constructed integrally with a centrally located bottom key section. The retaining wall is keyed into this footing five feet back from its outer edge.

The piers for carrying the columns rest on top of the footings about the location point of the bottom key section, and are designed to carry columns varying in size from 4 feet by 6 feet to 4 feet by 7 feet 10 inches. The retaining wall

Widening the Cut — Taken Late in 1923

buttresses are six feet thick, and are between the bases for the columns and the retaining wall.

The work of placing the wall and substructure has been carried on inside a steel pile cofferdam 60 feet deep. Pile driving was started on November 16, 1924. The driving was done by means of a heavy-duty locomotive crane which ordinarily would be considered overpowered for this class of work. The crane, however, was on the ground,

engaged in excavation work, and its use afforded an opportunity to make some low cost records on the pile-driving work.

A centrally located concrete plant was used. Aggregates are delivered to this plant in cars, unloaded, stored and fed into the overhead bins by means of a stiffleg derrick. A 1-cubic-yard mixer serves the tower hoist bucket. A swing boom and chuting plant distributes the concrete over the areas within reach.

The construction of the new station is under the direction of H. D. Jouett, who was connected with the Grand Central Terminal work in New York City.

The Appearance of the Work at the End of 1925 — Looking Toward the Hotel Cleveland and the Public Square.

Drainage of Sugar Cane Lands

One of the most-neglected factors of sugar cane production in Latin America is that of drainage. Some of the lands best adapted to the production of sugar cane are at present producing nothing but grass or trees because of the lack of drainage. Many sugar estates, which are now short of cane to keep their mills operating at capacity, have much land which requires only drainage to be highly productive. These lands include the following: (1) Arroyos or sloughs between hills where the water collects after rains, in which para grass grows luxuriously and crowds out the cane, or else in the dryer regions salt gradually accumulates and prevents the growth of any vegetation. Much of this low land is usually abandoned to the grass, no attempt being made to grow cane on it. (2) Near the sea coast are great areas of almost level lands which receive drainage from the higher lands and are saturated with moisture much of the time. In Porto Rico these are known as poyal lands. Both of these classes of poorly drained lands are usually extremely rich, as they contain the washings of the best soil from the higher lands. Some attempt has been made to reclaim lands of this sort in Porto Rico and Haiti by means of what is known as the "gran bank" system, but in Cuba these lands have received little attention so far. Some sugar estates could easily add 20 or 30 per cent to their area of productive land by systematic drainage. — *Azucar Havana.*

Two Large Tunnels in Course of Construction

Explosives engineers in both North and South America are now engaged in blasting through record-breaking railroad tunnels for each of their hemispheres. The Moffat Tunnel, which pierces the Continental Divide in Colorado, is under way. It will be 6.11 miles long, the longest railroad tunnel in North America, and will save 23 miles in railroad line. In South America they are driving a tunnel between Amadores and Alijilan, in the Province of Catamarca, Argentine Republic. It will be 6.75 miles long, and will make it possible to travel from Catamarca to Tucuman in from six to eight hours instead of the present journey of from 24 to 27 hours.

Both tunnels are being driven with gelatin dynamite. It is claimed that, because of its power and minimum amount of fumes, rapid tunnel building is possible with this explosive.

On October 18th, Edmund Paulsen, sales engineer for The Little Red Wagon Manufacturing Company, Omaha, Nebraska, passed away at the age of 63 years. Mr. Paulsen had been with this company for 24 years as blacksmith, foreman, factory superintendent, experimental engineer, and sales engineer.

Driving a Power Tunnel Through the Green Mountains

Description of the Work of Mason & Hanger Company in Building a 12,829-Foot Power Tunnel Near Whitingham, Vermont, Just Across the Massachusetts Line

By Benjamin Berman

Although the work described in this article was completed over a year ago, we feel that it will not lack interest to our readers, as Mr. Berman, who was assistant engineer on the job, has given much interesting detail.

THE Green Mountains, stretching from the Canadian border on the north through the state of Vermont to its southern boundary, have given that state much picturesque scenery. Deep and narrow valleys are characteristic of the state's topography. While such a country may tend toward isolation, it lends itself extremely well to the needs of the engineer seeking a site for a hydro-electric power development.

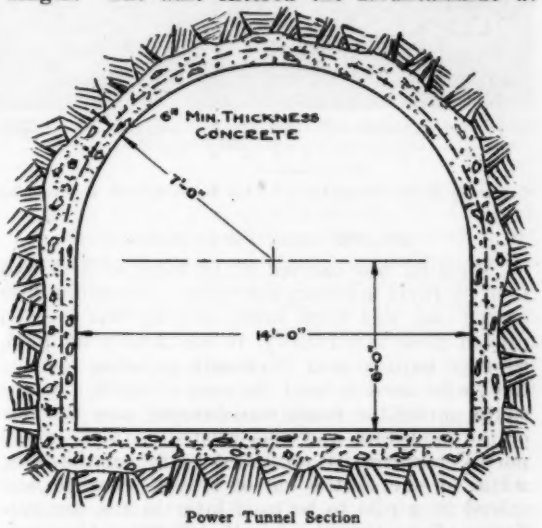
The Davis Bridge Hydro-Electric Development is located in Vermont close to the town of Whitingham at a distance of about eighty miles from the city of Worcester, Massachusetts, to which the 60,000 horse power, developed by the New England Power Company's power house, is transmitted over a 110,000-volt transmission line.

Map Showing the Location of the Davis Bridge Hydro-Electric Development Power Tunnel

This development necessitated the building of a power tunnel close to 13,000 feet long; this work was performed by Mason & Hanger Company of New York City, whose contract also included the building of the reinforced concrete intake tower, 120 feet high, as well as the concreting for the foundation of the steel surge tank 184 feet high and 34 feet in diameter.

Tunnel Driven from Four Headings

The tunnel, which runs in a northeasterly direction and passes entirely through rock of mica schist, trap and granite, was driven from four headings — from the north, the south, and from two headings which started at a midway point, which was made accessible by an adit 750 feet in length. The adit entered the mountainside at

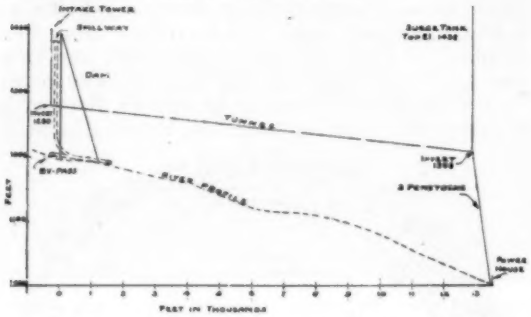


Power Tunnel Section

almost right angles to the tunnel. With the exception of 319 feet at the south portal, which is a circular section 14 feet in diameter, the tunnel section is that of a semi-circular arch 14 feet in diameter, with straight sidewalls 6 feet high. This gives a section 14 feet wide and 13 feet high, having an area of 161 square feet. The section of the adit is a rectangle 6 x 8 feet, an opening just large enough to allow passage for the muck cars. The grade of the tunnel is 0.1 per cent for almost its entire length. The exception takes place at the northern end, where the grade was made 4 per cent for 1000 feet in order that the tunnel could pass properly covered underneath a brook valley. Excavating operations were first started at the south portal on October 19, 1922, and light was seen through the tunnel on November 15, 1923.

The method used in driving the tunnel was

the top heading and bench, the heading being carried in advance of the bench by about 50 feet. Drilling was carried on by two shifts working ten hours each, and blasting was done at the close of each shift. By this arrangement, two hours elapsed between the shooting and the starting of the next shift, thus allowing the air in the tunnel to become clearer before the drillers entered the tunnel to begin work again. For drilling each heading, four Leyner drills mounted on columns (two drills per column) were used, while jackhammers were used on the bench.



Condensed Profile of the Davis Bridge Hydro-Electric Development

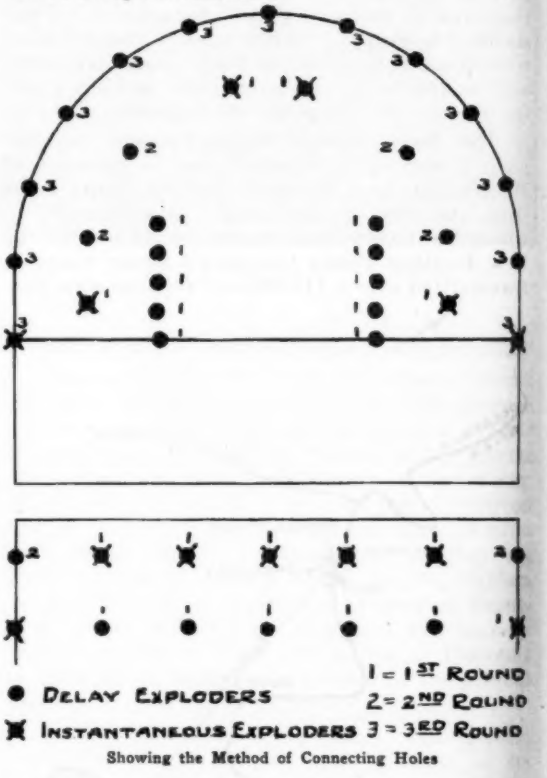
100,000 Cubic Yards Moved

Mucking was carried on by hand at first and then by Hoar mucking machines. A combination of the two was tried later, and as this method proved most satisfactory, it was finally adopted. Storage battery and Plymouth gasoline locomotives were used to haul the cars of muck. At the south portal the muck was dumped over the side of the mountain and was wasted. At the north portal, however, it was used as fill in the dam, while at the adit some of it was crushed and stored in a pile to be used later in the concrete lining of the tunnel. In all, 100,000 cubic yards of rock were removed, which is equivalent to 7.77 cubic yards per foot in the horseshoe section and 8.48 cubic yards per foot in the circular section. This required 532,500 pounds of dynamite, or 5.33 pounds per cubic yard.

Close attention was paid to the progress made in driving the tunnel. After each shot, the advance made by the heading, as well as its new station, were noted. This information, together with a sketch of the general shape of the break compared with the designed section, was kept on a special printed form for reference when the concrete lining of the tunnel was to be placed. By this means, the cost of the trimming, as well as the places where trimming was necessary, could be determined in advance. The average daily rate of progress was 8.5 feet per heading. Although very favorable in comparison with the progress made in other tunnels of the same section, this progress was made under trying labor conditions.

Great Difficulty Encountered in Holding Labor

Like all men who are confined, the tunnel workers were very strongly attracted by the open air. As there was plenty of work being done on the outside by other companies on this development, the men quit the tunnel within a short time after their arrival, to obtain outside jobs. This condition, which could not be remedied, was constantly breaking up the organization, with the result that a new labor crew was in evidence about every two months.



Showing the Method of Connecting Holes

As far as the actual driving was concerned, no hindrances to progress occurred except where the tunnel passed underneath a brook valley. At this point, a flow of 60 gallons per minute entered the tunnel. This flow was soon overcome and presented no further difficulty. It is well to note also that work on the tunnel was not delayed by the hard winter of 1922-1923, during which season twelve feet of snow fell.

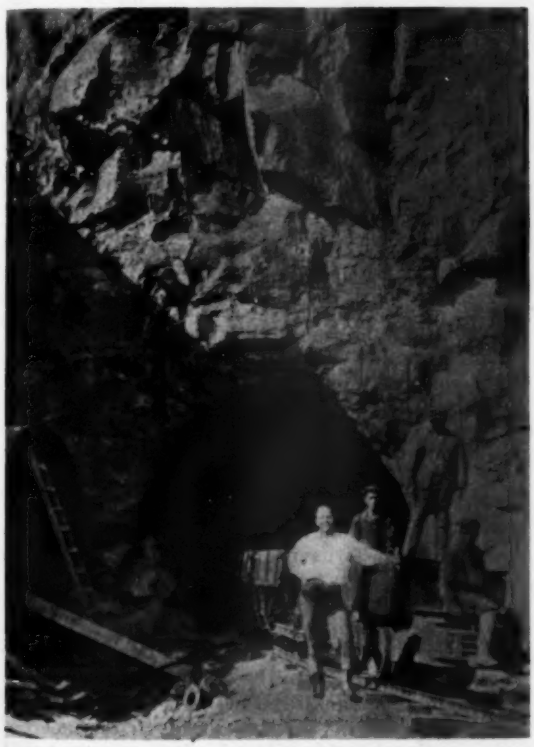
From the nature of the location of the points of operation, it was necessary to have complete equipment at each of the three portals. This was the same at all three portals, with the exception

that at the adit two gyratory crushers, a No. 3 and No. 5, were installed, and two compressors, one of 1700 and another of 750 cubic foot per minute capacity, were substituted for two of 750 cubic foot per minute capacity, which were sufficient for each of the other portals. Besides these, each portal was supplied with an 800 cubic foot per minute blower for ventilation, a blacksmith shop containing one drill sharpener with shank and bit punch, motor generator set for charging 4-ton electric locomotives, and an oil furnace and pumps.

Material Brought to Job Over 1,000-Foot Cableway

As the rock through which the tunnel was driven was self-sustaining, with the exception of a short length at the north portal where timbering was necessary, the lining of the tunnel took place when the bore was completed. The concrete for the lining was supplied from a central plant located at the adit. Sand and cement were raised from the level of the Hoosac Tunnel & Wilmington Railway by means of a 1000-foot cable-way to a bin of 300 yards capacity, which fed a one-yard mixer placed underneath it. Crushed stone from the stock pile was also supplied to the bin by means of a 4-cubic-yard car hoisted to the top of the bin by means of an inclined track. The concrete was hauled into the tunnel by a train of four cars pulled by a storage battery locomotive.

A Plymouth gasoline locomotive emerging from the adit. The section is a rectangle, 6 feet by 8 feet.



South Portal. Extending from this portal for a distance of 319 feet the section is a circle 14 feet in diameter. Note the rock formation. On the left of the picture is the mouth of the steel ell which leads to the surge tank.

Concreting progressed from the adit to the north and to the south by means of traveling steel forms into which the concrete was shot by a pneumatic gun. The lining, which had to be a minimum thickness of 6 inches in the horseshoe section and 14 inches in the circular section, was poured in three stages. The invert was placed in two operations, and the arch and sidewalls in one. While placing the invert, twelve inches of sidewall were also poured. Insofar as it is known, the progress made on this job in lining the tunnel has never been equalled in other tunnels of this type. In 97 calendar days, 22,800 cubic yards of concrete were placed, which is an average of 234 cubic yards per calendar day. Of the total concrete placed, 18,450 cubic yards were placed by the pneumatic gun, or an average of 190 cubic yards per calendar day.

Labor had to be recruited from distant places as the location of the development offered no supply. Albany, Boston and New York City were some of the sources where labor was obtained, although there were instances where men were transported from as far south as Tennessee. Free transportation was offered to all those who remained in the employ of the company for three months. But in spite of this inducement, very few

took advantage of it, and, as a result, the labor was not organized at all times into a very efficient body.

Camp Accommodations

The development being in an isolated location, it was necessary to provide accommodations for the quartering and messing of about 350 men. Camps were therefore built near each of the three portals, where the men were housed and fed at cost. In quarters, as well as at mess, white men

North Portal. Note the loose rock formation which was characteristic of this end of the tunnel only.

were separated from the colored, and, as a result, harmony reigned between the two races. For further comfort of the men, dry houses were established at each portal, where the men could change their clothing before entering and after leaving the tunnel.

From May to August 1923, labor became very scarce. To insure a sufficient supply of high-grade men, wages were increased. This increase amounted to 12 per cent of the payroll. In December 1923, however, wages were cut to about the level at which they were prior to the increase.

Those who like tabulated facts, may find the following figures of interest:

Number of calendar days	378
Cubic yards excavated	100,000
Cubic yards excavated per calendar day	264.4
Cubic yards excavated per heading per calendar day	66.1
Dynamite required, pounds (5.33 pounds per cubic yard)	532,500
Number of days actual work	343
Cubic yards excavated per day worked	292
Cubic yards per heading per day worked	73
K. W. H. power utilized	2,800,000
K. W. H. power per cubic yard excavated	28
Cubic yards concrete placed	22,800
Cubic yards concrete placed per foot	1.8
Concrete placed to rock removed	23%

The contract was at all times under the direct and personal supervision of the officers of the Mason & Hanger Company, together with William R. Ury, general superintendent, and Fred Stiefel, construction engineer.

Railroad Construction in Florida

The Florida East Coast Railway Company are making good progress on the double-tracking of their main lines in Florida. When the work now under way is completed, 230 of the 366 miles of line between Jacksonville and Miami will have been double-tracked. It is the plan to complete the remainder next year.

The C. G. Kershaw Contracting Company of Birmingham is at work on a section between Sunbeam and Saint Augustine, and also the 30-mile double-track Moultrie cut-off between Saint Augustine and Bunnell. This cuts off about 20 miles from the old line.

The Donohoo Construction Company of Jacksonville have 10.4 miles between Daytona and Spruce Creek; Reid & Lowe of Cocoa, Florida, 25 miles between Titusville and Bonaventure; John A. Kelly Company of Philadelphia and Miami is at work on 59.3 miles, exclusive of two short sections, between Jupiter and Little River, and also 12½ miles on the Miami Belt Line from Larkin to Hialeah.

The double-tracking work is being done under the supervision of Calvin Oberdorf, engineer of construction for the railroad. It is expected that the above-mentioned work will be completed by January 1st of next year.

Excavation Operations in a Belgian Cement Plant

The Work of a Bucyrus 20-B Electric Shovel Digging Raw Material for the Plant of Société Anonyme des Ciments Portland Artificiels et Engrais Chimique de et à Obourg

AT Obourg, Belgium, a little town not far from Mons, in September, 1914, began the fighting of the first big battle of the World War in which the British were engaged. In fact, the first encounter took place at the canal shown in one of our illustrations.

Today, eleven years since this battle, the scars of conflict have disappeared, and the hum of industry supplants the roar of high explosive.

This particular part of Belgium is an excellent economic location for a plant manufacturing Portland cement. Société Ciment o'Obourg are particularly fortunate, for in addition to being located at the natural source of their raw materials — chalk and clay — their plant lies on the banks of the "Canal du Centre," on which waterway that part of its product which is exported finds its way to the sea at a very much lower transportation cost than by rail. The domestic consumption is supplied by shipment over the State Railway, which also passes the door of the plant.

An aerial view of the plant of Ciments d'Obourg. Note the canal and the railroad upon its bank. The small railway for raw material hauling may be seen crossing the canal from the buildings toward the reader to Quarry which is just out of the picture.

The company was founded in 1911, and was first equipped with one large kiln for the manufacture of artificial Portland cement by the so-called wet process. Their business has grown so that now, since 1922 in fact, they operate three 197-foot revolving kilns.

Plant Layout

The quarry of this company's plant lies just across the canal from the main buildings, and the raw material is hauled in small cars over a short railway which crosses the canal and delivers the chalk at the mill. Until recently cars of 700 litres (about .9 cubic yards) were hauled over this line by chain. Now, however, cars of 1,000 litres or 1.3-cubic-yards capacity and of the self-dumping type are moved about the double track system by cable. The plant, including the quarry, has a total area of 70 hectares or about 175 acres. Power is obtained from the Société Intercommunal Belge d'Electricity Power Station, and enters the plant as three-phase, fifty-cycle, 5,000-volt current. This current is stepped down in two transforming stations to 500 volts.

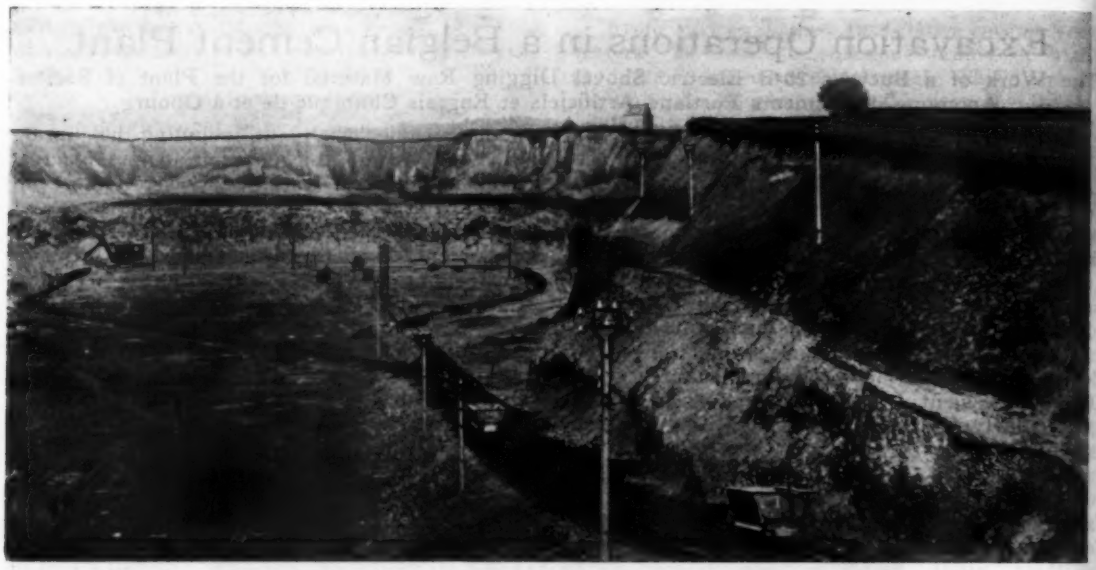
The Advent of the Shovel

Formerly the chalk quarry was operated entirely by hand. Small blasts broke down the material which slid down channels in the face into the cars, the surplus being loaded by hand. The height of the face varied from 10 to 20 meters (33 feet to 66 feet). Increasing cost of manual labor led to the consideration of mechanical methods of excavation, with the result that a Bucyrus 20-B two-motor electric shovel, equipped with a ¾-yard dipper, mounted on caterpillars, was installed.

This shovel has replaced the manual labor of 40 quarry workmen, and has eliminated the necessity of blasting the material. The cars when manually loaded were pushed by hand from the loading spurs to the point where the cable hauling system started. Now the cable system makes a loop past the shovel, the returning cars are disconnected for loading and reconnected to the cable when full.

The small size of the cars makes spotting rather difficult, but even with this difficulty, and with the machine working against a face as high as 22 feet, the output is approximately 67 cubic yards per hour. At the completion of the present cut the work will be laid out with lower working faces, more adapted to the size of the shovel.

In their process of manufacture the chalk and clay are thoroughly mixed in powerful "diluters,"



View of quarry after shovel installation (shovel at left of picture). Note the new arrangement of the railway.

View of Chalk Quarry of Ciment d'Obourg before the installation of the revolving shovel. Note the several sidetracks for loading, and the broken chalk at the bottom of the face. In the foreground may be seen the Bucyrus 20-B in course of erection.

Views of a Belgian Cement Company's Chalk Quarry

The Three Large Revolving Furnaces or Kilns in Which the Chemical Reactions of the Raw Materials Take Place

1,300 degrees centigrade (about 2,900 degrees Fahrenheit). The resulting "clinker" or rock cement is cooled in special tubes, kept for five weeks in storage piles, and then ground to the fine powder which we know as Portland cement. The product of several days is mixed, to insure a uniform quality.

The yearly output of this plant is 150,000 tons of an artificial cement said to conform to the official requirements of the different European countries and America.

and then ground to a fine powder in silex pebbled mills. This wet powder or paste is then placed in large vats, where additions of chalk or clay are made in the quantities indicated by careful tests.

When the correct mixture is obtained, the paste is fed into the three long cylindrical steel kilns (197 feet long and 9 feet in diameter). These kilns are inclined 60 degrees with the horizontal and revolve slowly about the long axis; the paste is fed into the upper end while into the lower end rushes a flame of pulverized carbon with a temperature of

The Small Revolving Shovel Up Against a High Face in the Quarry

Concrete Base for Asphalt Surfaced Roads

"The Concrete Base for an Asphalt Wearing Surface" is the title of a paper read by W. B. Fowler, city engineer of Memphis, Tennessee, at the Third Asphalt Paving Conference, at Louisville, Kentucky.

Memphis has adopted the sheet asphalt paving with 1½-inch binder course, and 1½-inch wearing course, with a 6-inch, 1-3-6 concrete base.

Regarding the construction of the roads of Memphis, Mr. Fowler says: "Too much stress cannot be laid upon the proper preparation of the subgrade, regardless of the type of base used.

"In mixing concrete only enough water should be used to bring the water to the surface under tamping, the ordinary sloppy mixture will not give good results.

"Base concrete should be tamped same as concrete wearing surface. In Memphis this tamping is done with a board 3 inches wide and 5 feet long, with a handle at each end, used by two men working from curb to curb with the board parallel with the street.

"After the surface is thoroughly tamped in this way it is broomed to take out the inequalities of the surface, leaving it rough enough to key into and prevent slipping of the asphalt. This surface is then kept wet for not less than seven days before asphalt is laid.

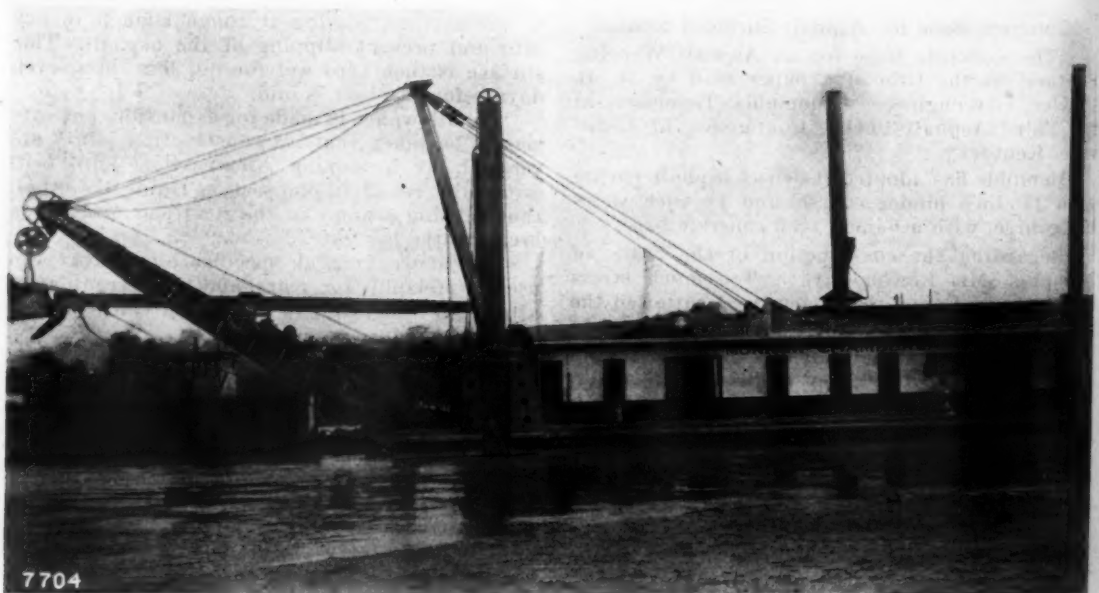
"No allowance is made for expansion, but care should be taken that all construction joints are vertical, as a sloping construction joint will eventually result in one section riding the other, thus causing a hump in the road and probably a break in the concrete."

The above general specifications have been used in Memphis for years, and the percentage of asphalt failures due to base failure has proved to be less than one per cent.

Mr. Fowler suggests that perhaps the design used in the city of Memphis would not meet the requirements of a rural highway, as the loading of a rural highway is different from a city street.

The highway is usually narrow, often barely wide enough to accommodate two lines of traffic. This places the outer wheels near the outer edge of the pavement, which, therefore, becomes the weaker part of the pavement, while in the city street the edges next the curb are used less than any other part of the pavement because of parked or standing vehicles.

The Plant from the River Side, Showing Derrick for Unloading Scows, the Hopper, the Screening House and Part of the Bins, Etc.



The Dixie Sand and Gravel Company's 2½-yard Bucyrus Dipper Dredge Loading Barges in the Tennessee River near Chattanooga, Tenn.

Dredging Sand and Gravel from the Tennessee River

Plant of the Dixie Sand and Gravel Company with Description of Dipper Dredge Operations

ALMOST under the shadow of the famous Lookout Mountain on the Tennessee River in Southern Tennessee, the Dixie Sand and Gravel Company of Chattanooga are operating a sand and gravel plant, material for which is taken from the river by a specially designed dipper dredge. The details of this plant and the operation of the dredge are sufficiently out of the ordinary to warrant attention.

Why a Dipper Dredge Was Installed

The company was organized 20 years ago as the Bible Sand and Gravel Company. From the beginning the dredging of the sand and gravel from the river presented a difficult problem. A dredge of the elevator or ladder type was first used for this purpose. The dredge was a complete unit, the material being crushed and screened on board, and the oversize dumped back in the river. Difficulties were encountered. The crushing plant proved too heavy for the dredge, and resulted in its sinking. The government engineers finally put an end to this method of operation by prohibiting the deposit of the spoil in the river, due to the effect on the power plants below.

A floating derrick was then installed. This was equipped with a 65-foot boom and a 4-yard orange-peel bucket. This dredge overcame the first difficulty, and was successful in certain parts of the river, but owing to the extremely hard consistency of the material the scope of its operation was limited. The material in many places is exceedingly difficult to dig, consisting of cemented gravel and boulders, which at times looked like concrete. It was found that a clamshell bucket could not successfully handle this material, as it would not cave to the bucket. Consequently, it was determined to install a powerful dipper dredge of the latest design.

The Dredge

This dredge was built by the Bucyrus Company, and was put into operation in May of this year. It is a steel hull boat, equipped with a 2½-yard dipper and 54-foot dipper handle, which permits it to dig in 30 feet of water. For use in shallow digging a 38-foot handle will be used.

The main machinery is driven by a 10½-inch x 12-inch horizontal double engine, and the swinging machinery by an 8-inch x 8-inch engine of the same type. The port and starboard spuds are also handled by a 7½-inch x 7-inch independent engine. Steam is furnished by a 66-inch x 20-foot locomotive-type boiler.

The hull, as stated, is of steel, 95 feet long by 34 feet wide, with a draught of 6 feet.

Dredge Operation

The dredge has proven that it has sufficient power to dig the extremely hard gravel and rock with no difficulty. In fact, since it has been in operation it has not been necessary to close down the plant for lack of material, which had previously been a frequent occurrence. The dredge is served by ten barges of a capacity of about 200 cubic yards each. These barges are towed to the crushing and screening plant by a small oil-burning tow boat. A steam tow boat is kept on hand for use in emergencies.

Chester Padgett, Superintendent, to the Left, and W. H. Kline, Chief Engineer, to the Right, Standing by the Capstan of the Dredge

The dredge is operated by a crew of five men, the operator, the cranesman, the fireman, one deckhand and one oiler. The oiler helps the deckhand in spotting barges. This is done every six to nine minutes when the dredge is in operation. A steam capstan is used for this purpose.

The company has devised a simple device for saving time and increasing output, by keeping an empty barge 21 feet wide between the dredge and the barge which is being loaded. This makes it unnecessary for the operator to rack in and out every cycle, and materially increases the time when the dredge is actually digging, not to mention the ease of operation for the operator.

The Plant

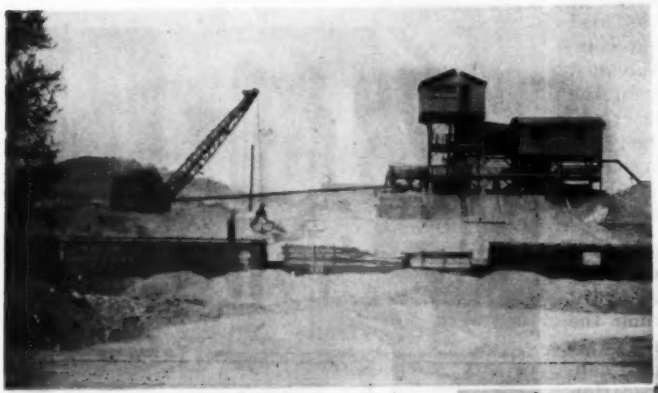
The crushing and screening plant, which was built in 1921, is of the most modern design. The barges are unloaded by a 3-yard clamshell bucket, operated by a derrick which is set on a concrete foundation as illustrated herewith. The material is deposited by this derrick into a hopper, from which it is fed to the main crusher, which is a 16-inch Superior McCully, using a set of 54-inch x 24-inch Worthington rolls for re-crushing.

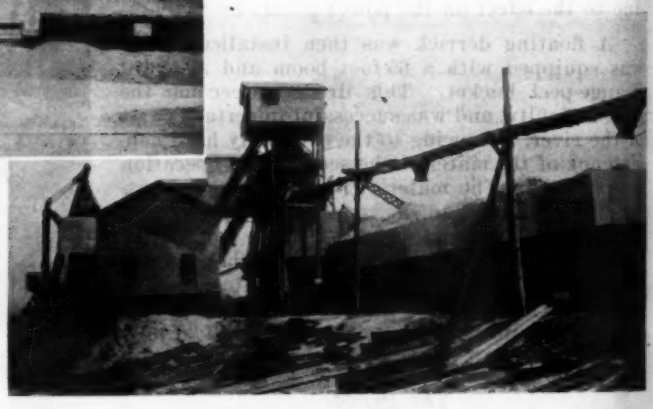
From the crusher it is carried in a pan conveyor, which elevates it to the screen. Here it is separated, the various sizes of gravel and sand going to sumps, from which it is taken to concrete storage bins by an electric revolving crane mounted on railroad trucks. These storage bins are 300 feet long by 75 feet wide, with a height of 25 feet, and are divided into compartments for the various sizes. A railroad track is provided alongside the bins, over which is a chute which permits cars to be loaded direct from the sump without rehandling from the bins. The electric locomotive crane handles the material from the bins to railroad cars on a track on the opposite side of the bins. Material is also loaded directly from the storage bins into trucks and teams for local delivery.

The plant is equipped with a first-class machine shop in which all ordinary repairs can be made; it contains two lathes, three drill presses, a big shaper, emery wheels and other tools.

The general efficiency of the plant is well reflected in the pride that the operators of the dredge have in its appearance. The engines are kept painted with green enamel, and condition of engine and boiler rooms is such that any power house superintendent might look upon with envy.

Richard Hardy, the mayor of Chattanooga, is president of the company; W. H. Kline is chief engineer; Chester Padgett, superintendent; Walter Flack, plant foreman; Andrew Lawson, captain and operator of the dredge; and J. L. Bell, master mechanic.





Above: The Land Side of the Plant Showing the Bins and the Locomotive Dragline in Operation

Right: Side View of the Plant, Showing the Storage Bins and Pan Elevator and the Loading Track

$1,250,000 for Work on Dams

An appropriation of $1,250,000 to further work on Ohio River dams in the Louisville district has been announced by the Chief of Army Engineers, according to reports from Washington. The allotment includes the following: Dam No. 44, Leavenworth, Indiana, $40,000; No. 45, Addison, Kentucky, $50,000; No. 46, Owensboro, $100,000; No. 49, Uniontown, $250,000; No. 50, Caseyville, $210,000; No. 52, Smithfield, $350,000, and No. 53, Joppa, Illinois, $250,000.

This appropriation does not include the power and navigation dam at Louisville, for which Col. G. R. Spalding, engineer in charge of the district, expects $500,000. The initial appropriation will be used to lay tracks and install sawmill for making timber for cofferdams. It is estimated that the dam will cost $11,000,000, of which the Louisville Hydro-Electric Co. will pay approximately $7,500,000. It will be more than two miles long.

Beg Your Pardon

Through an error the clamshell bucket illustrated on pages 420 and 421 of *The Excavating Engineer* for November was incorrectly named—it is a "Williams Favorite."

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The Current Situation

Taken all in all, the year of 1925 has justified those who forecast for it a widespread and yet a non-sensational prosperity. As in most periods of prosperity the benefits are not shared by all industries alike; some have found the year a lean one, while others have had a most spectacular boom. Examples in point are the sugar trade, which at the present time is more or less depressed, while in Florida, real estate soars. People prophesied a widespread prosperity for the year just past, and based their prophecy upon expected easy money conditions. There has been no indication that such easy money conditions are to end. Another favorable factor in this connection is the Locarno Conference which has led the way definitely and decisively to peace in Europe, reduction in armaments, balanced budgets and recovery of business.

The news comes from Washington that the treasurer believes that there will be a surplus of 290 million dollars for the fiscal year ending June 1926. This means that a cut in taxes of from 250 to 300 million dollars is a possibility. There are many other plans for tax reduction, and this problem, so very interesting to all of us, will receive a good deal of thought within the next few weeks. The treasurer does not propose any definite rates but presents to you the certainty that tax reform can go to a 25 per cent maximum normal and surtax without the slightest danger to our future revenues.

We give a tabulation showing the tax paid by the head of a family with no dependents:

Income	Present Law	Alternative Suggestions	
$ 3,000	$ 7.50	$ 5.00	$ 5.00
4,000	22.50	15.00	15.00
5,000	37.50	25.00	25.00
6,000	57.50	45.00	40.00
$ 7,000	$ 87.50	$ 75.00	$ 65.00
8,000	127.50	105.00	95.00
9,000	167.50	135.00	125.00
10,000	207.50	175.00	155.00
11,000	277.50	275.00	195.00
12,000	347.50	325.00	245.00

Not only will the lowering of income taxes free much money each year for investment in business, but the anticipated repeal of many excise and nuisance taxes should also prove a considerable boom to trade.

Miscellany

About a month ago a seat on the New York stock exchange sold for $135,000. 44 years ago the price of $15,000 for a seat in this body was considered fabulous. In 1914 a seat could be bought for $34,000.

About three weeks ago the stock exchange had the biggest day in its history.

In Florida the real estate boom is still in full swing and there are indications that activity in real estate will become general in other sections of the country. A shore development on Long Island sent real estate prices skyrocketing and promises other dramatic booms.

It is announced that the United States Steel Corporation, for the quarter ending September 30, 1925, earned $42,400,412, the highest figure since the first quarter of 1924. In spite of the fact that the motor stocks have recently led the advancing market United States Steel is still looked upon as the permanent leader among industrial companies.

Business conditions in general promise prosperity for some time to come.

United States Sand and Gravel Output

The output of sand and gravel in 1924 from plants in the United States, as reported to the Bureau of Mines, Department of Commerce, amounted to about 156,527,967 short tons, valued at $97,241,641. This was an increase of 12 per cent in quantity and 7 per cent in value over the production reported for 1923.

Seven states shipped over 10,000,000 tons each, New York, Indiana, Illinois, Michigan, Pennsylvania, California, and Ohio, in the order named, New York shipping 13,397,540 tons and Ohio 10,379,361 tons. Pennsylvania led in value of output, its shipments being valued at $10,927,752. New York, Ohio, Illinois, California, Michigan, and Indiana followed in the order named, the output of Indiana being valued at $5,070,339. Many other states showed increases. The average value per short ton was 62 cents, as compared with 65 cents in 1923.

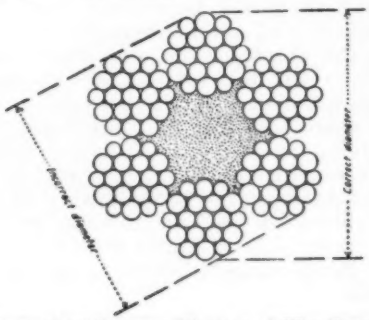
· FIELD NOTES ·

Measuring the Diameter of a Wire Rope

The following is given by *Power,* in reply to a question as to the proper method of measuring a wire rope:

"Some types of wire rope are laid up so that their external surface forms almost a true circle, in which case the rope has practically only one diameter. In the rope generally used on elevators this is not true, and there is considerable difference between the maximum and minimum diameters as indicated in the figure. The maximum diameter is the correct one to use in specifying the diameter of wire rope. In other words, the diameter of a rope is the diameter of the minimum-sized circular hole that the rope can be passed through.

"A rope that has been in use will be of smaller diameter than when new, due to the strands bedding into the hemp center and also due to



Correct and Incorrect Diameter of Wire Rope

stretch, and wearing of the strands. The sizes of hoisting ropes between 2-inch and 5/8-inch diameter generally are in steps of 1/8 inch. If the maximum diameter of an old rope was found to be 11/16 inch, this dimension is less than 3/4 inch and greater than 5/8 inch, therefore it will be safe to assume that the cable was 3/4 inch in diameter when new. Below 5/8-inch steel or iron cable changes in diameter in steps of 1/16 inch. In elevator service the sizes expressed in sixteenths of an inch are not used to any great extent."

Dipper Don'ts

Don't continue to pull the dipper through the bank when it is full — this only wastes power.

Don't start swinging until the dipper has cleared the bank — you may break the handle or the boom.

On railroad-type shovels, truck mounted, don't swing until you know that the jack screws are properly set on a firm foundation.

Watch Your Fire

Coal is mostly carbon, and when a fire is started oxygen must be supplied to make it burn.

When equal parts of carbon and oxygen unite under sufficient temperature, we have carbon monoxide, while when two parts of oxygen are supplied for one of carbon we have carbon dioxide.

With monoxide the fire burns slowly with a blue flame, and the tar in some coals is melted so that it "runs" and fills up the air space in the fire bed. The supply of oxygen is soon cut off, the fire becomes black and the volume of black smoke increases.

With such a fire the coal is slowly coked, and the heat in the coal is not liberated fast enough to be of use.

The result is that the draft in the stack pulls large quantities of unburned gases through the stack with a heavily carbon-laden smoke.

While with carbon dioxide the fire burns brightly, and the gases in the combustion chamber keep burning until by the time they reach the stack all but a small percentage of the gases are burned, and only a small volume of light gray smoke passes through the stack.

Large volumes of dense smoke means incomplete combustion with low carbon dioxide and high carbon monoxide — a costly fire.

Life of a Chain

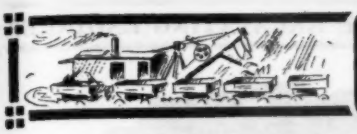
A severe and unavoidable wear on the outside of hoisting chain links occurs when the second wrap starts on the drum.

The links climb, and when slipping down to a firm bearing position, causes a tearing action, which, especially in the absence of proper lubrication, will wear the chain rapidly.

This cannot be avoided, but the life of the chain can be more than doubled by turning the chain end for end and upside down, in fact anyway that will keep changing the position of the link on the drum.

Another method suggested to us is to attach a piece of old chain to a new chain long enough to make about one and one-half wraps, and later, when the new chain shows sufficient wear, remove this extra piece and attach the hoisting chain directly to the drum.

Suppose this short extra piece is applied when a new chain is put on. When the chain shows enough wear turn it upside down, then end for end, later upside down. Next the short piece may be removed and the whole procedure repeated — eight changes.



SHOTS FROM THE · FIRING LINE ·

Central States Notes

BY H. C. DAVIS

W. J. Newman Co., 21 North Curtis Street, Chicago, Illinois, has two Bucyrus shovels, a 20-B and a 30-B, working at Kedzie and Howard Streets, making a 14,000-yard excavation for the sanitation work which is being done by the city of Chicago. J. Lyons is the foreman in charge of this work. James J. Casey and George H. Goulder are engineer and fireman, respectively, of the 30-B, and Ed. Hornage, engineer, and Herb Waltman, fireman, of the 20-B. At the present time about 10,000 yards has been dug.

On another job W. J. Newman Co. is making a 4,000-yard excavation at the corner of Michigan Avenue and Lake Street. D. Nolan is the foreman, Al. Krueger, the engineer, and Sam Pettigrew, the fireman, of the Bucyrus 30-B which is doing the work.

On Oak Street between Dearborn and Clark Streets in Chicago W. J. Newman is using an 18-B Bucyrus clamshell to make a 1500-yard excavation. J. Snyder is the foreman, B. Mitchell, the engineer, and John Carlson, the fireman, of the Bucyrus 18-B which is doing this work.

Roy Williams writes that he is craning a Bucyrus 95-C at Oglesby, Illinois. Emil Koehl is the engineer on this shovel. Between them they are loading 300 to 345 four-yard cars in eight hours.

Iowa and Missouri

BY W. G. PARROTTE

List & Bagnull have finished their team work on the Missouri Pacific second track.

Dave Keening has finished his Missouri Pacific work and moved his team outfit to St. Louis on a subdivision job.

List Construction Co. were awarded the seven-mile cut-off on Southern Pacific at San Antonio, Texas.

Halpin-Boyle have their shovel busy grading the southern end of Troost Avenue, Kansas City, Missouri.

The Greatwestern Portland Cement Co., Mildred, Kansas, have rented a Bucyrus 20-B gas shovel from List Construction Company to strip clay at their quarry.

Paul Patton keeps his shovel busy on basement work all over Kansas City.

New York State News

BY J. P. BURNS

Wm. H. Madden, and Bennett & Wood, Inc., with offices in Exchange Building at Rochester have joined forces on an excavation job for the New Rochester Saving Bank Building. This is a 13,000-yard job which they expect to finish in 15 days.

N. A. Ryan, Albion, New York, has one of the finest sand banks in the upper part of the state. He has purchased considerable equipment to take care of his increasing business.

The Leroy Stone Corporation, Leroy, New York, has purchased a set of caterpillars in place of traction wheels for their railroad-type shovel. Mr. J. L. Heimlick is president and general manager. They are using two of the railroad-type shovels and expect to keep working throughout the winter.

H. L. Snyder is superintendent of Lehigh Cement Company's plant at Catskill. This plant is now the largest in the world.

Acme Cement Co., Catskill, are doing considerable construction work at their quarry and plant. They are using five shovels including a Bucyrus 68-C electric. W. H. Baker is general manager, G. G. Owens, purchasing agent, and J. P. Gilbert is foreman at the quarry.

Vanness & Shaffer, with office at 24 Liberty Street, Waverly, New York, have had a successful year on excavation work between Binghamton and Elmira. Mr. Shaffer operates his own shovel, which accounts for progress made.

Sparr & Lasher Co., Inc., Poughkeepsie, New York, were awarded a new contract in Dutchess County of 3.10 miles at a price of $204,561.98.

The firm of O'Dea & Ambrose, Binghamton, New York, have a road job in Broome County. This job is 2.19 miles. They were low bidders at an estimate of $85,173.60.

At the letting in Albany, November 6, the Ban Dudsen Lumber Co. of Corning, New York, were successful bidders on the Monroe Co. of 3.66 miles; out of 21 proposals they were awarded the contract at a price of $127,053.50.

Pacific Coast Notes

BY P. H. BIRCKHEAD

Subcontract awarded by Palmer & McBryde, San Francisco, to Davis-Heller-Pearce Co., Delta Building, Stockton, for four miles of railroad (Cement Company's portion) to be built in connection with cement plant at Kentucky House, near San Andreas, Calaveras County, for Calaveras Cement Company, 315 Montgomery Street, San Francisco. This four miles involves about 100,000 cubic yards excavation.

Bond election was held November 10th by the City of Oakland, to vote on issuing bonds in the amount of $9,960,000 for the construction of the first unit of the City of Oakland's harbor development.

Construction will start at once by Pacific Gas & Electric Co., O. W. Peterson, construction engineers, 245 Market Street, San Francisco, on $2,500,000 power plant in connection with Melones Project for South San Joaquin and Oakdale Irrigation Districts.

Contract awarded to McCray Co., American Bank Building, Los Angeles, who bid $55,907 for grading and surfacing 1.4 miles from Summerland to Montecito, Santa Barbara County. Engineer's estimate, $74,795.

Contract awarded to Collins & Seppi, 107 West Maple Street, Stockton, who bid $56,305 for 0.91 miles grading and surfacing from Pismo to 1 mile south, San Luis Obispo County. Engineer's estimate, $70,916.

Contract to E. W. Dahl, Santa Ana, who bid $13,056 for surfacing work and grading in Ventura County. Engineer's estimate, $12,157.

Contract awarded to United Dredging Co., Los Angeles and Oakland, who bid $288,390 for dredging in the entrance channel to Long Beach Harbor, Section A and B, work involving the following approximate quantities: 809,100 cubic yards of material to be dredged and disposed of.

Southern States Notes

BY W. W. WHORLEY AND C. N. BALLENTINE

George Short, who has been handling shovels in the Pittsburgh, Pennsylvania, district dropped in to see us recently.

C. R. Penn writes us that he is handling a Bucyrus 20-B Diesel for F. A. McKenzie at Wildwood, Florida, and that she certainly is a sweet running machine.

R. L. Rogers is plant foreman for the Alabama Sand & Gravel Company at Montgomery, Alabama.

J. W. Shafer reports that he is overhauling a dragline for the Lake Worth Drainage District near Boynton, Florida.

J. T. Moses is loading road surfacing gravel with a Bucyrus 20-B for J. H. Bull at Fort Payne, Alabama.

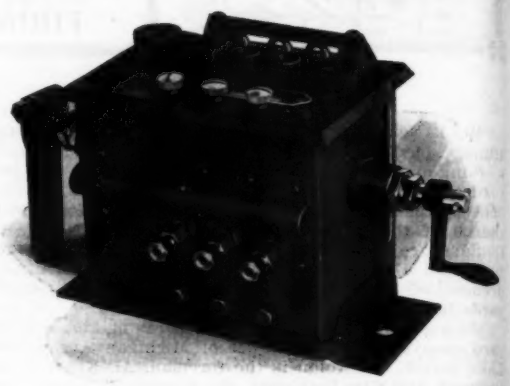
L. V. Barber is digging foundations in Chattanooga with a Bucyrus 20-B high lift shovel.

Dave Brown reports things as active in the Mountain City, but entirely too much rain for the contractor.

We regret to announce the recent death of R. V. Lee, who was well known and liked among the shovel men of this district. Mr. Lee had recently accepted a position as foreman of the Woodstock Slag Company of Birmingham. During an argument with one of the employees, Mr. Lee was fatally shot before he had a chance to defend himself.

Rufe Hardeman is digging brown ore with a Bucyrus 50-B at Giles, Alabama, for the Central Iron & Coal Company. Keller Dickey is stripping overburden with an Atlantic shovel. John Shackleford is in charge of the mines.

A large number of contractors journeyed to Montgomery, Alabama, recently to attend one of the largest lettings ever held by the State Highway Department. Awards were made as follows: St. Clair County, surface treatment with penetration asphalt of approximately 34 miles of road across the county on the Birmingham-Gadsden Highway, via Springville and Ashville, awarded to Sam Finley, of Atlanta, for $129,259.80; Geneva County, 14.6 miles of sand clay road between Geneva and the Coffee County line in the direction of Enterprise, awarded to J. R. and J. B. Miller, of Baconton, Georgia, for $102,208.73; Escambia County, 17 miles of graded road between Flomaton and Perdido Station, contract awarded to John Floyd of Huntington, Tennessee, for road work $74,067.57; and contract for bridges on the project to Lamb & McLemore of Eutaw for $25,028.80; Covington County, 6.46 miles of sand clay road between Gantt and Searight to Newell Contracting Company, of Birmingham, $111,742.01; Marion County, paving in the town of Winfield, to Nixon & Phillips, of Lineville, $19,155.65; Franklin County, 12.73 miles of gravel road between Russellville and Mounton to W. M. Thompson, of Fayette, $136,656.08; Coffee County, 5.84 miles of road between Elba and Troy, mostly sand clay, with a stretch of gravel in the town of Elbar, to Woffard & Company $24,022.18; Jackson County, 23.19 miles of chert road between Scottsboro and the Tennessee line toward Chattanooga, Section A, to Newell Contracting Company, $121,079.47; Section B, to Bessemer Engineering Company, $160,667.38, bridges on the project, to Lamb & McLemore, $86,713.24.



Madison-Kipp Lubricators come in Blind and Sight Feed Types. Blind Feed up to four feeds. Sight Feed—any number of feeds.

NO valves — exposed parts—or packing

Force-feed lubrication can be done without ball and check valves — without exposed parts that gather dirt and trouble — without plunger or piston packing that will have to be renewed from time to time.

Madison-Kipp Lubricators have no valves. They work on the Kipp valveless principle.

They are self-contained. All working parts are enclosed and operate in oil.

Their plungers require no packing whatever.

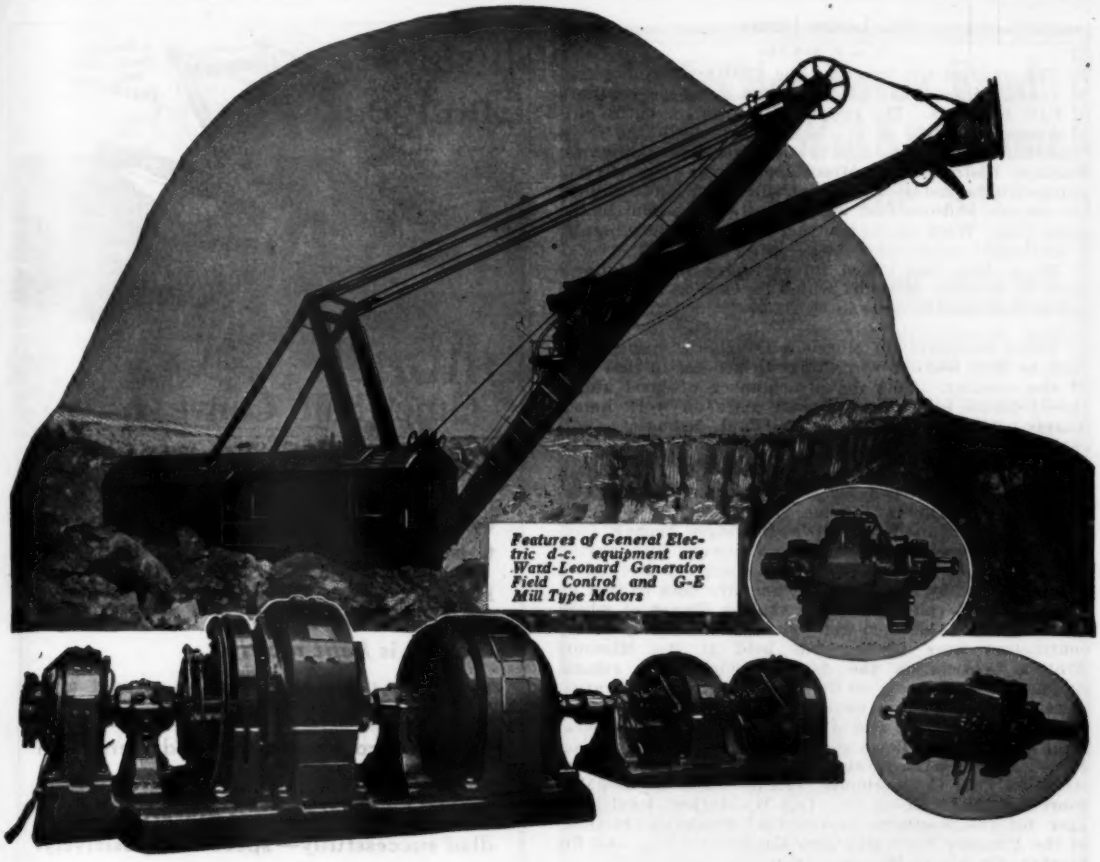
We have prepared a bulletin which describes the inside mechanism of Madison-Kipp Lubricators which we will send to anyone requesting it.

May we mail one to you? Ask for Bulletin No. 50.

Madison-Kipp Corporation

Madison, Wisconsin, U.S.A.

For convenience in making inquiry use postal inserted in this number.



Dig it *electrically*

The electrical operation of shovels offers a simple, compact, safe method of the use of powered machinery. It means bigger shovels, handling greater tonnage—less attendants—flexibility in operations through elimination of complicated mechanical equipments—lower cost of operation—reduced power costs—minimum maintenance costs.

G-E engineers are experienced in the application of electric equipment to shovels. They cooperate with leading shovel manufacturers to give better machinery to the excavating engineer—by electrification.

Ask the nearest G-E office for information in detail to suit your requirements.

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St. Louis Items

BY A. B. KOENIG

The contract for installing the $200,000 sewer system of Venice, Illinois, has been awarded to Moore Brothers of East St. Louis. The system will drain the entire city of Venice, and will carry the water through the levee constructed some time ago by the East Side Levee and Sanitary District to the Mississippi River. Two electric pumps will be installed, one that will pump 17,000 gallons per minute, and one that will pump 19,000 gallons in the same time. Work on the contract will begin immediately.

W. A. Ross has added forces to his state highway work in Western Missouri which he expects to complete before cold weather sets in.

James Dougherty of Morris & Dougherty spent a day with us here looking over things in general in this part of the country. They have a number of good steam shovel outfits idle that they can place on work immediately. 514 Globe Building, St. Paul, Minnesota, will catch them.

A party of contractors and sportsmen, including Victor Miller, mayor of St. Louis, returned from a ten-day hunting trip in Canada, the guests of Edward Bridges, president of the Edward Bridges Asphalt Paving Co., a successful bidder on numerous city paving contracts in the past. They brought back six deer, one a fine buck shot by Mayor Miller, and five does bagged by the others. A celebration and venison dinner at which the Board of Aldermen and friends of the mayor and contractors were invited was held at the Missouri Athletic Association the day following their return. Among the contractors on the trip and at the celebration were G. Locke Tarlton, owner of the Central Paving Co., Missouri Paving Co. and a large stockholder in several local and East St. Louis contracting companies and concerns; A. W. Davis, president of the Frazier-Davis Construction Co.; C. A. Homer, vice-president of the Missouri Portland Cement Co.; Lon W. Harlow, local manager for the Southern Surety Co.; Frederick Pitzman of the Pitzman Surveying and Engineering Co., and his brother, Dr. Marsh Pitzman.

John Cox is grading property work at Miami, Florida, and reports two shovels and 60 teams at work.

J. P. Sparks, 836 North Kirkwood Avenue, Kirkwood, Missouri, wants a ten-team outfit to place on about 16,000 yards of highway work in Iron County, Missouri. He also wants someone to drive 780 feet of piling on road work near West Alton, Missouri.

John Kenney, Astoria, Illinois, wants a job suitable for a team and small car outfit.

Columbus S. Jones and wife returned from a trip through Florida.

Wm. Brothers, Kimswick, Missouri, has finished a job at Hickory, Kentucky. He has 20 teams and a ¾-yard shovel idle that he can place on work immediately.

J. J. Connor & Son has been awarded a $2,250,000 contract for building a 10-inch pipe line from the Smackover, Arkansas, and Eldorado, Arkansas, oil fields to the Mississippi River, where the oil will be handled up and down river by barges. The pipe line, about 150 miles long will pass largely through timbered country. It will be built for the Crusader Pipe Line Company, an English concern affiliated with the Dutch-Schell Syndicate. Construction beginning at once will be finished about Feb. 1.

Instantly — **and by power — the Buckeye conveyor is shifted from one side to the other.**

High enough to load direct into wagons or trucks. No time lost in the shift — the dirt is *kept moving.*

And the dirt comes up *steadily.* The extra wide belt, kept centered by a patented construction, is driven from both ends.

The wettest, slipperiest material is handled successfully — speedily — positively.

In crowded quarters the Buckeye Quick-Shift Conveyor enables you to keep going when trees or poles are close to the trench.

But don't judge Buckeyes by only one feature. There are many others equally profitable for you to have.

Ask us to explain them. Or, better yet, *ask any user.*

The Buckeye Traction Ditcher Company
Findlay, Ohio

Manufacturers of Trench Excavators (both Wheel and Chain-and-Bucket Types), Pipe Line Trench Excavators, Tile and Open Ditchers, Back-Fillers, Pipe Screwing Machines, Curb Diggers and Clay Diggers.

There's a Buckeye Sales and Service Office Near You

BUILDERS OF TRENCH EXCAVATORS FOR 30 YEARS

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Announcement

Bucyrus Company
now offers a

SIX-WHEEL TRAILER

Designed for hauling steam shovels and other heavy machinery.

It can be loaded from the rear as well as over the sides.

For price and specifications apply to

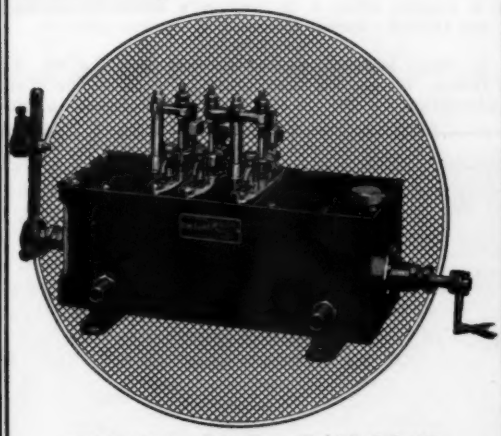
SPECIALTY DEPARTMENT
BUCYRUS COMPANY
South Milwaukee, Wis., U.S.A.

A McCord Force Feed Lubricator Will Keep Your Shovel on the Job

A McCord force feed lubricator installed on your steam shovel now will insure more continuous operation. Dependable force feed lubrication prevents shutdowns and delays, it gives more hours on the job.

McCord force feed lubricators are used as standard equipment by the largest and best-known steam shovel builders and they will be installed on any shovel at your request.

Put a McCord lubricator on now and be assured of dependable lubrication for the life of your shovel.



McCord Class B. A. Force Feed Lubricator

McCord Radiator & Mfg. Co.
Detroit, Michigan

McCord
force feed
Lubricators

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Allhands & Davis were awarded contract for 50 miles of bank widening by the Cotton Belt Railroad in Arkansas. E. S. Price will be in charge of this work.

Hamer Construction Co., Box 332, Campbell, Missouri, has a 15-team, wheeler and fresno outfit idle at that point and wants any kind of grading, railroad or highway.

Thompson & Stewart of Yorkville, Tennessee, are low bidders on six miles of road work between Roellen and Tatumville, Tennessee.

John Burke one of the good old timers is still alive. He's taking things easy in Kansas City. The writer met him there the other day looking as good as ever.

Jack O'Leary of the Cherryvale Construction Co. is visiting his friends here. Jack is dabbling in real estate with his son Bill at Fort Pierce, Florida. His other son, John Jr., is in the real estate business at Palm Beach, Florida.

T. M. Coleman shipped his team outfit from Dana, Illinois, on to a piece of Shea Bros. work near Dyersburg, Tennessee.

Denison & Denison was awarded contract by the Missouri-Pacific Railroad grading a spur track to United States Dredging fleet at Bridge Junction, Arkansas.

Con Costello spent a couple days here with his folks. He is looking after J. R. Swigart's steam shovel work on the Illinois Central Railroad at Farina, Illinois.

M. Edw. McGuire passed through here on his way to Texas. Ed has his team outfit at work on the Walsh Construction Co. job on the Big Four Railroad in Ohio.

J. McMurry of the McMurry Contracting Co. spent a couple of weeks at Mineral Wells, Texas. He returned to Kansas City the other day feeling and looking better than ever.

Jim Joyce reports lots of rain during the past month on the Illinois Central cut-off near Greendale, Illinois.

Twin City District

BY J. CARL YETTER

Figures for the state road work contained in bids opened by the Minnesota Highway Department in the last two lettings would indicate that bottom prices were reached. This applies to paving and graveling as well as grading.

The M. J. Nolan Construction Company have recently placed a number of subs on their St. Joseph work.

Bill Schultz is operating a Bucyrus 50-B Diesel shovel for Foley Bros. at Darling, Minnesota.

Barnard & Curtis of Minneapolis have recently been awarded a drainage contract at Bowling Green, Ohio.

Erickson & Johnson of Minneapolis were recently awarded another grading contract in Hennepin County.

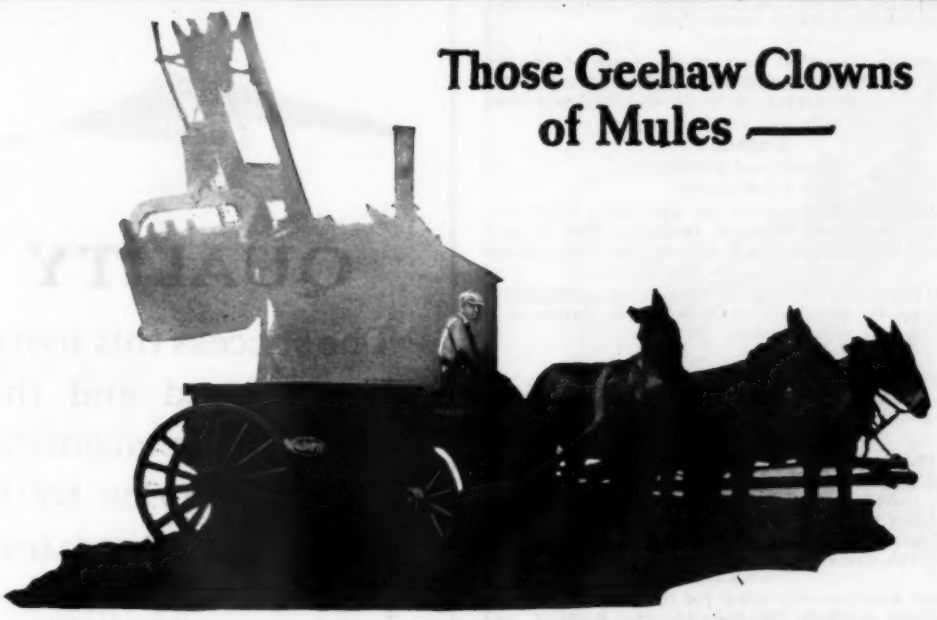
Fritz Fischer is operating a Bucyrus 20-B Diesel shovel for the North Dakota Construction Company at Hackensack, Minnesota.

Zap Collier's Company have recently added a Bucyrus 50-B shovel to their equipment at Zap, North Dakota.

A Map by "Tisdale of Tennessee" Showing Points in That State Other Than Dayton.

1 — Reelfoot Lake. Formed by earthquake in 1811. State-owned fishing and hunting preserve. 2 — Union City. New plant of the Brown Shoe Co., of St. Louis. 500 hands. 3 — Martin. New cigar factory. Center of new electric-power development. 4 — Strawberry-raising area. State leads the country in strawberries. 5 — Palmersville. New cheese factory. 6 — Pottery clays. 7 — Paris. New cigar factory. 8 — Memphis. Cotton center and great manufacturing city. Where the "Blues" school of music originated. 9 — Clarksville. Center of tobacco and snuff-growing and manufacturing. 10 — Dickson. New factories for making baseball bats, raincoats and cigars. 11 — Rockdale. First iron furnace in the world to make ferro-phosphorus iron direct; only other one at Cumberland Furnace, Tennessee. 12 — Shelbyville. Chicken hatchery — one million chicks a year. 13 — Tullahoma. Baseball factory. Golf-club shaft factory. 14 — Pulaski. New cigar factory. Civil War Ku Klux founded here. 15 — Nashville. State capital. Manufacturing and educational center. 16 — Murfreesboro. Largest co-operative creamery in the country. 17 — Christiana. Cedar pencil factory — one of many in Tennessee. 18 — Rock Island power plant; 33,000 kilowatts. 19-21 — Coal fields. 20 — Hale's Bar power plant; 50,000 kilowatts. 22 — Sequatchie Valley. Cattle raising, creamery, canning factories. 23 — Daisy. Face-brick plant. 24 — Chattanooga. Manufacturing center. 25 — Robbins. Only paving-brick plant in Tennessee. Largest in South. 26 — Knoxville. Important manufacturing center. 27 — Roane County. New peach-orchard development.

—Nation's Business for November 1925.



Those Geehaw Clowns of Mules —

They'll Pull a Western Farther Than Any Other Wagon of Equal Strength

When these fellows lose out, you lose too. WESTERN Dump Wagons have no needless weight — every ounce is made to count.

Western

That's Why!

THOSE joke mules are just as much members of your outfit as anyone else. Their hoof marks show all over the profit and loss columns. WESTERN Dump Wagons, the result of years of study of practical field conditions, are built to withstand the pounding of a steam shovel throughout a long, hard life; but at the same time they are light enough to be easy on the stock.

On one forced job, WESTERN Dump Wagons were overloaded with nearly three tons of rock to the wagon, which then had to be hauled out of the pit and over a rough road. It is on jobs like that one that WESTERN Dump Wagons have made their name.

Built with either wood or steel bolster, as you prefer.

Western Wheeled Scraper Company

Earth and Stone Handling Equipment Since 1877

Aurora, Illinois

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Erickson & Johnson have subbed a part of their Hennepin County work to Jolmar Nelson.

We are very sorry to hear of the death of Charles Sherbing, St. Cloud, Minnesota. Mr. Sherbing was for many years a prominent railroad and highway constructor.

Canada

Toronto and Vicinity

BY C. F. ENGLAND

The Atlas Construction Co. are away to a good start on the big culvert at Welland, Ontario. This is part of the work let under Section 6, New Welland Ship Canal.

A still further move is being made in connection with the Toronto Viaduct, and we understand tenders will be called shortly for the Queen Street Subway.

The Port Arthur Construction Co., Ltd., Toronto, was recently awarded contract for the construction of the West Pier of the Eastern Channel, Toronto Harbor.

The Hydro Electric Power Commission of Ontario are making an extension of their street railway lines in Windsor, Ontario. The following contractors have already started work on the project: McArthur Engineering & Construction Co., Ltd., Ryan Construction Co., Ltd., and The Cadwell Sand & Gravel Co.

Tenders were recently called for the construction of a new baseball stadium for the Toronto Baseball and Athletic Club.

A. A. Tirrill

Allen A. Tirrill, 52 years old, an inventor and consulting engineer of the Westinghouse Electric and Manufacturing Company died recently. Mr. Tirrill was the inventor of a voltage regulator bearing his name.

For many years he was associated with the General Electric Company, Schenectady, New York, and in 1910 became an engineer at the Westinghouse Company. He left the company in 1916, but since that time had been one of its consulting engineers.

In 1914 he was awarded the John Scott legacy medal for his meritorious inventions, together with a diploma. He was a member of the American Institute of Electrical Engineers and St. John's Lodge No. 48, I. O. O. F., of New Hampshire.

STROUD "LITTLE RED"

The Little Red Wagon Mfg. Co.
Omaha, Nebraska

QUALITY

The success this tooth has enjoyed and the constant replacement of other styles by it furnishes the greatest proof of its worth.

SERVICE

Most builders of steam shovels can meet your requirements by shipments from stock. If they cannot we can.

Write for Exchange Proposition

TAYLOR-WHARTON IRON & STEEL COMPANY
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Have **You**
Considered
What
An **Advantage**
It Would Be
To Have a
POWER DIPPER TRIP
On **Your**
Shovel

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Ask

BUCYRUS COMPANY
SPECIALTY DEPARTMENT
SOUTH MILWAUKEE, WIS., U. S. A.

THE BEST CHAIN
IS CHEAPEST IN THE END

Delays on the job, encountered with chain that is "just as good," make the price of the "cheap" product absolutely prohibitive to the contractor who knows his costs.

Taylor-Mesaba chain, built with 52 years' experience behind each link, is the cheapest in the long run.

Write for Catalog E

TAYLOR MESABA
STEAM SHOVEL CHAIN

S. G. Taylor Chain Co.
641 Marquette Building
CHICAGO, ILL.

TRADE NOTES

Mr. J. W. White, manager of the *Westinghouse Electric International Company's* branch office at Havana, Cuba, has been made general manager of the recently formed Westinghouse Electric Company of Japan.

The Climax Engineering Company announce the appointment of new agents as follows: The Coast Machinery Corporation, San Francisco, for the State of California; The George W. Whitehead Company, in Buffalo, for Buffalo and Western New York; Edward C. Dingman, Montreal, for Montreal and vicinity; Howard Turnbull & Company, Ltd., Toronto, for Ontario; The Advance Contractor Repair Company, Chicago, for the Chicago territory; and the Mine and Smelter Supply Company, Salt Lake City, for Utah.

The E. I. du Pont de Nemours & Co., Inc., in their Explosives Service Bulletin for October describe and illustrate a method of filling tamping bags above ground. Simple apparatus for preparing the dummies is shown. The bulletin may be obtained by addressing the du Pont Company at Wilmington.

The S. G. Taylor Chain Company have just issued a four-page folder in which they give the safe loads for their Taylor-Mesaba double sling chains, and outline several rules for safety which should be remembered by those using chain. A copy may be obtained by writing the company at 140 South Dearborn Street, Chicago, Illinois.

The Chicago Pneumatic Tool Company, 6 East 44th Street, New York, have recently issued a broadside illustrating some of their tools that are best adapted for railroad use. A copy of this may be obtained by writing the manufacturer.

The Easton Car and Construction Company, Easton, Pennsylvania, have recently issued a bulletin 8½ x 11, eight pages, illustrating and describing the Easton Won-Way cars. These cars are particularly adapted for quarry service, and are built in four sizes ranging from 4 to 8 cubic yards. A copy of this bulletin, Number 41, may be obtained by writing the manufacturer.

Fairbanks-Morse

Type "Y" Diesel Engine

THE PRODUCT F M OF EXPERIENCE

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Manufacturers of Oil Engines, Pumps and Electrical Machinery

THE NORDBERG PATENTED TRACK SHIFTER

The Modern Way to Shift Track

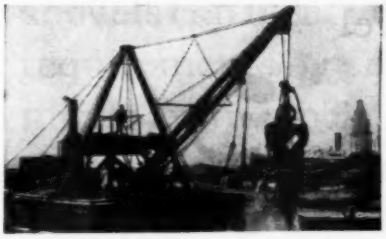
Moving track frequently by the old-time hand methods is slow and costly. This machine with its one operator and a few laborers will replace that expensive track crew and shift four times the amount of track. Track jacks or bars are not needed when the Track Shifter is used. No investment in machinery can show greater results in decreasing costs and increasing profits.

Write for Bulletin GR-8.

NORDBERG MFG. CO., Milwaukee, Wis.

NORDBERG

Hayward Buckets



Producing profits from rocks

Operated by a Hayward Skid Excavator, this Hayward Orange Peel Bucket is producing profits from a difficult job.

The combination makes a unit that is rapid in operation, easily moved from place to place, and which can be used on land or water.

Send for Bulletin 613.

THE HAYWARD COMPANY

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Builders of Clam Shell, Orange Peel, Drag Line, and Electric Motor Buckets; Dredging, Excavating, Coal Handling Machinery; Automatic Take-Up Reels; Counterweight Drums. 3241-Y

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Buckeye Trencher Equipped with TWIN CITY Engine.

OTHER Twin City users include: Austin Machinery Corp., Baldwin Locomotive Works, Bucyrus Co., The Parsons Co., Northwest Engineering Co., The Harnischfeger Corp., Pennsylvania Pump & Compressor Co., Star Drilling Machine Co., Washington Iron Works, Willamette Iron & Steel Works, etc. Specify Twin City Engines on *your* equipment. Sizes 35 to 140 H. P. Write for literature.

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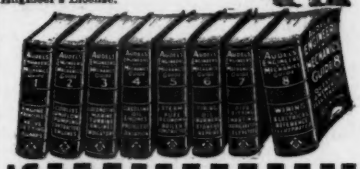

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Blue Center Steel Wire Rope

Roebling Wire Rope can always be depended upon to lift the heaviest loads and to give the longest, trouble-proof service. It is the choice of the man who wants the best on the market and freedom from worry.

Write for Catalog.

John A. Roebling's Sons Company
Trenton, New Jersey

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REVIEW OF BOOKS and CATALOGS

We shall be glad to review, in this column, such books and catalogs as are sent to us.

MANUAL OF INSTRUCTIONS—Bridge Department, California State Highway Commission — 5 inches x 7½ inches, 179 pages and cover, divided into two parts. Part 1, investigation of materials and structures; Part 2, construction; space is given to management, duties of resident engineer, standard reports and construction details. Those connected with state highway organizations would find much of interest in the book. The editors are A. M. Morton, State Highway Engineer, and Harlan D. Miller, Bridge Engineer, California State Highway Department, Sacramento, California.

MECHANICALLY OPERATED FLOW METERS — 8 x 10½, 44 pages, describing and illustrating mechanically operated flow meters for measuring fluids and gases. Copy of this Bulletin GEA-10 may be obtained by writing the *General Electric Company, Schenectady, New York.*

A 1925 REVIEW OF THE DEPARTMENT OF THE INTERIOR — 5¾ x 9, 39 pages and cover, a review of the Department of Interior activities for 1925. A copy may be obtained by writing the *Government Printing Office, Washington, D. C.*

DIGGING CLAMSHELLS

Mud, muck and boulders all look alike to the Dreadnaught — and the sight of one of these husky clamshells working is convincing evidence that Blaw-Knox Buckets "have the guts."
If you have a digging job or a material handling job —

We Have the Bucket!

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633 Farmer's Bank Building
Pittsburgh, Pa.

BLAW-KNOX

Locomotive Type Boilers
for
Cranes, Steam Shovels, Draglines

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To meet requirements of the A. S. M. E. Code, Canadian Interprovincial or Foreign Governments.

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Specializing in Boilers for Contractors' Equipment
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